

Teachers'
retirement system,
State of Montana
actuarial
evaluation as of
July 1



3 0864 1005 0453 2

S
351.5
Tl trsav
1977

TEACHERS' RETIREMENT SYSTEM

STATE OF MONTANA

ACTUARIAL VALUATION

AS OF

JULY 1, 1977

STATE DOCUMENTS COLLECTION

OCT 8 1992

MONTANA STATE LIBRARY
1515 E. 6th AVE.
HELENA, MONTANA 59600

PLEASE RETURN

INTRODUCTION


In accordance with Chapter 62, Section 75-6205 of the Teachers' Retirement Law, an actuarial valuation of the Teachers' Retirement System of the State of Montana has been completed. The purpose of this valuation was to determine the position of the fund, the normal cost, and the unfunded accrued liability based on present and prospective assets and liabilities of the System as of July 1, 1977.

The valuation was based on employee data and other records maintained by the System as of June 30, 1977, and incorporates all amendments of the Retirement Law as of July 1, 1977.

This report presents the results of the valuation.

Actuarial Certification

Based upon the assumptions stated herein and the data maintained by the Teachers' Retirement System, the actuarial valuation has been performed in accordance with generally accepted actuarial principles and techniques.



Alton P. Hendrickson
Associate of the
Society of Actuaries

ANALYSIS OF VALUATION

As a result of the valuation which was conducted as of July 1, 1977, we have concluded that the Montana Teachers' Retirement System is funded on an actuarially sound basis. The present contribution rate of 12.499% of salaries is sufficient to finance the cost of the benefits as they accrue in the future as well as to amortize the current unfunded liability over a period of 43 years and 9 months.

On July 1, 1977, benefit increases were granted to teachers who had retired prior to July 1, 1971. This legislative change increased the liabilities of the system. To finance these additional liabilities, the statutory contribution rates were increased from 12.375% of salaries to 12.499%, with an employer rate of 6.312% and an employee rate of 6.187%. This valuation has determined that the additional contribution of .124% of salaries is sufficient to support the additional liabilities.

In preparing this actuarial report, we conducted two studies pertaining to the actuarial assumptions, including the present rates of termination by teachers and the average age at which teachers are currently retiring.

Termination Rates

The previous study of termination rates was based upon data during the five year period 1966 through 1971. Our recent study examined the years 1975 and 1976. This period was selected because of the availability of statistics maintained by the Teachers' Retirement System on its new computer processing system. There was no data available on the computer for years prior to 1975. Also, the data for 1977 was determined to be inadequate inasmuch as a full 12 month period was not available.

Our study indicated that the rates of termination by teachers has decreased significantly since the original study. It appears that this decrease was attributable to three factors:

1. The current unemployment situation along with a full supply of qualified teachers has made jobs less available and therefore diminished the mobility of teachers.
2. The improvement in teachers' salaries as well as retirement benefits has given greater incentive to remain in the teaching profession.
3. The data available on active members in the previous study may have been incomplete. This would have tended to have shown a higher rate of termination than was actually experienced by the Teachers' Retirement System. The new computer processing system has increased the accuracy of this study.

In studying the termination rates assumed in the valuation, consideration was given to the fact that many of the teachers who withdraw their funds from the system return to teaching and have their previous credit restored by repaying the amount of their refund with interest. The termination of these teachers does not represent an actuarial gain to the system.

As a result of our study, we determined that it was necessary to modify the current termination assumptions and to set new assumptions in accordance with our findings. The result of this change was to increase the liability of the Teachers' Retirement System. This liability increase was partially offset by the fact that larger contributions are expected in the future because of the decrease in withdrawals.

Retirement Ages

In recent years, legislation has been passed which allows teachers to retire at earlier ages. We used computerized data in conducting a study to determine if there has been any change in the trend toward early retirement. The conclusion of our study was that teachers are retiring at an earlier age and that the average retirement age in recent years has been approximately age 62½. This represents a 1½ year drop from age 64 which was the average retirement age determined in the 1971 study. It appears that average retirement ages are remaining around age 62 because social security benefits are not available until that age.

Based upon this study, we reduced the average retirement age to age 62. This actuarial assumption also increased the liability somewhat.

Other Factors

In addition to the legislative change and assumption revisions noted above, several other factors were instrumental in increasing the liabilities of the system. The average salaries paid to teachers increased approximately 21% during the last two years. The membership of the system also increased 7.3%. These two factors combined resulted in an increase in payroll of 30%.

The improved retirement benefits and the increase in the number of inactive members resulted in a 55% increase in benefits paid to the inactive members.

The investment yield has been larger than the investment rate assumed in the actuarial valuation which has helped to offset the increased costs of the program.

METHOD OF FUNDING

The method of funding employed is commonly referred to as the "entry-age normal cost method". This method establishes a "normal cost" for each member as well as an unfunded accrued liability. The annual normal cost is the level percentage of annual salary required to fund the benefits assuming this percentage had been contributed since the member's entry into the System.

The unfunded accrued liability represents the liability for accrued benefits which has not been previously funded. This liability can arise from four sources:

- (1) If the member began teaching prior to the establishment of the System (1937), and thus did not contribute during the prior years;
- (2) If the member received additional credit which was not funded or only partially funded, such as military service and out-of-state teaching credit;
- (3) If benefits were increased for which no funding had been previously made;
- (4) If actuarial losses were incurred when actual experience varied from expected experience.

In order to maintain the System on an actuarially sound basis, the total rate of contribution should be such as to meet the normal costs in addition to making progress toward the amortization of the unfunded accrued liability.

ACTUARIAL ASSUMPTIONS

Since the true cost of the retirement plan will be directed by its own experience, certain assumptions must be made as to the expected experience. The following is a summary of the assumptions used in the valuation:

Mortality Rates

The mortality rates for males and females are based upon a published table referred to as the 1971 Group Annuity Mortality Table.

Rates of Mortality

<u>Age</u>	<u>Female</u>	<u>Male</u>
25	.042%	.064%
30	.056	.083
35	.078	.115
40	.112	.168
45	.167	.300
50	.257	.543
55	.390	.875
60	.657	1.304
65	1.140	2.048
70	1.937	3.296
75	3.849	5.423
80	6.752	9.077
85	10.720	14.015
90	16.433	20.059

Disability Rates

The disability rates for males and females are based upon the male ordinary disability rates published by the Railroad Retirement Board in its eighth valuation.

Rates of Disability

<u>Age</u>	<u>Female</u>	<u>Male</u>
25	.015%	.015%
30	.015	.015
35	.020	.020
40	.045	.045
45	.095	.095
50	.170	.170
55	.310	.310

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the Teachers' retirement System during 1975-76.

<u>Age</u>	<u>Rates of Withdrawal</u>
25	18.1%
30	13.7
35	10.6
40	8.1
45	5.6
50	3.1
55	1.9

Salary Scale

The rates of salary increase are based upon a study conducted in 1975 on base salary increases by age as a result of longevity. In addition to the base increases, an inflationary increase of 5% per annum is assumed.

Expected Final Salary at Age 60 As a Multiple of Current Salary

<u>Age</u>	<u>Female</u>	<u>Male</u>
20	10.59	12.07
25	7.39	8.22
30	5.12	5.53
35	3.70	3.92
40	2.78	2.89
45	2.13	2.18
50	1.65	1.66
55	1.28	1.28
60	1.00	1.00

Retirement Rates

Based upon the actual experience of the Teachers' Retirement System during 1975-76, retirements were assumed to occur at an average age of 62. The retirement age was appropriately extended for those members with less than 5 years of service at age 62 and for those members who have already attained age 62.

Investment Earnings

An annual rate of $6\frac{1}{4}\%$ is assumed for future investment earnings.

Expenses

Administrative expenses are to be paid from investment income in excess of the assumed rate of $6\frac{1}{4}\%$.

Assets

The security investments are valued at amortized book value. The real estate mortgages are valued at full principal value.

SCHEDULE I

NORMAL COST ALLOCATION

Contribution Rate

	<u>Female</u>	<u>Male</u>	<u>Total</u>
Retirement	5.859%	5.027%	5.389%
Death	.481	.885	.709
Disability	.318	.287	.300
Vested	1.178	1.087	1.127
Return of Contribution	.990	.694	.823
Total	8.826%	7.980%	8.348%

- (1) Present Value of Future Salaries of
Present Members \$2,238,264,339
- (2) Normal Cost Contribution Rate 8.348%
- (3) Present Value of Future Normal Costs for
Present Members ((1) x (2)) \$ 186,850,307

SCHEDULE II

UNFUNDED ACCRUED LIABILITY ALLOCATION

(1) Present Value of Benefits (Schedule III)	\$ 650,534,903
(2) Present Value of Future Normal Costs (Schedule I)	186,850,307
(3) Trust Fund Assets (Schedule IV)	142,973,994
(4) Unfunded Accrued Liability ((1)-(2)-(3))	<u>\$ 320,710,602</u>

Amortization over 40-year Period

(5) Present Value of Salaries of Members during next 40 Years	\$7,212,495,854
(6) Unfunded Accrued Liability Contribution Rate ((4) by (5))	4.447%
(7) Normal Cost Contribution Rate (Schedule I)	8.348
(8) Required Contribution Rate	<u>12.795%</u>

Current Period of Amortization (43 9/12 Years)

(9) Present Value of Salaries of Members during next 43 9/12 Years	\$7,726,104,601
(10) Unfunded Accrued Liability Contribution Rate ((4) by (9))	4.151%
(11) Current Contribution Rate ((7) + (10))	12.499%

SCHEDULE III
ACTUARIAL BALANCE SHEET

Assets:

(1) Trust Fund	\$142,973,994	
(2) Present Value of Future Contributions for Unfunded Accrued Liability	320,710,602	
(3) Present Value of Future Contributions for Normal Costs	<u>186,850,307</u>	
Total Assets		\$650,534,903

Liabilities:

(1) Present Value of Benefits - Inactive members		
(a) Retirement	\$127,101,226	
(b) Death	6,213,853	
(c) Disability	6,050,036	
(d) Vested	2,500,202	
(e) Dormant	625,051	
(f) Tax-Sheltered Annuity	193,328	
(g) Excess Interest Payment	<u>31,225</u>	
		\$142,714,921
(2) Present Value of Benefits - Active Members		
(a) Retirement	\$361,593,557	
(b) Death	41,307,081	
(c) Disability	15,932,022	
(d) Vested	60,572,632	
(e) Return of Contributions	25,896,852	
(f) Legacy Fund	22,235	
(g) Tax-Sheltered Annuity	<u>2,495,603</u>	
Total Liabilities		<u>\$507,819,982</u>
		\$650,534,903

SCHEDULE IV

SUMMARY OF FUND OPERATION

Trust Fund as of July 1, 1976		\$122,822,013
-------------------------------	--	---------------

Receipts:

Contributions		
Received	\$23,916,374	
Accrued	2,457,243	
Investment Income		
Received	9,099,279	
Accrued	<u>305,991</u>	
		35,778,887

Disbursements:

Benefit Payments	\$13,371,099	
Withdrawal Refunds	2,046,266	
Operational Expenses	231,355	
Prior Year Corrections	<u>(21,814)</u>	
		<u>15,626,906</u>

Trust Fund as of June 30, 1977		\$142,973,994
--------------------------------	--	---------------

SCHEDULE V
COMPARISON SUMMARY

	<u>Fiscal Year Ended 1975</u>	<u>Fiscal Year Ended 1977</u>
Present Value of Benefits	\$456,976,945	\$650,534,903
Present Value of Normal Costs	134,228,869	186,850,307
Unfunded Accrued Liability	219,345,049	320,710,602
Active Members		
Number of Lives	14,373	15,429
Annual Payroll	\$174,958,880	\$227,689,613
Inactive Members		
Number of Lives	3,338	4,146
Monthly Benefits	\$ 828,653	\$ 1,283,827
Contributions Based on Payroll		
Employer Share	\$ 10,934,930	\$ 14,371,768
Employee Share	\$ 10,716,231	\$ 14,087,156
Assets	\$103,403,027	\$142,973,994
Net Investment Income	\$ 6,456,664	\$ 9,405,270
Net Investment Yield	6.75%	7.34%

SCHEDULE VI

SUMMARY OF ACTIVE MEMBERS

Females

<u>Nearest Age</u>	<u>No. Of Lives</u>	<u>Average Service at Ret.</u>	<u>Average Current Salary</u>	<u>Average Projected Benefit</u>
- 24	871	39.46	\$10,676	\$4,838
25 - 29	2,336	37.70	11,916	4,123
30 - 34	1,265	35.61	13,263	3,176
35 - 39	818	32.25	14,363	2,296
40 - 44	670	28.46	14,374	1,540
45 - 49	586	25.91	14,840	1,112
50 - 54	452	23.35	15,073	793
55 - 59	519	22.97	15,383	618
60 - 64	325	22.34	15,466	519
65 -	43	20.23	14,237	445
	<u>7,885</u>			

Males

<u>Nearest Age</u>	<u>No. Of Lives</u>	<u>Average Service At Ret.</u>	<u>Average Current Salary</u>	<u>Average Projected Benefit</u>
- 24	360	39.23	\$11,486	\$5,727
25 - 29	1,694	37.33	12,603	4,735
30 - 34	1,574	35.71	14,722	3,738
35 - 39	1,267	33.43	17,340	2,980
40 - 44	888	31.64	19,048	2,303
45 - 49	710	30.26	19,687	1,732
50 - 54	532	30.01	20,383	1,377
55 - 59	349	28.84	21,198	1,090
60 - 64	147	25.26	20,679	799
65 -	23	20.13	20,156	641
	<u>7,544</u>			

SCHEDULE VII

SUMMARY OF INACTIVE MEMBERS

<u>Form of Payment</u>	<u>No. Of Lives</u>	<u>Average Age</u>	<u>Average Benefit</u>
Normal Retirement	3,515	68	\$327
Early Retirement	153	58	206
Disability	175	63	273
Spouse's Benefit	235	62	207
Child's Benefit	<u>68</u>	<u>13</u>	<u>100</u>
Total	4,146	66	\$310
 Tax-Sheltered Annuity	 28	 70	 \$ 67

COMMENTS

Actuarial Position

From an actuarial standpoint, we are pleased with the progress the Teachers' Retirement System has made in adequately funding the benefits provided by the System. Although there has been a trend toward earlier retirement and a decrease in the number of terminations, the System has continued to be maintained on an actuarially sound basis. This soundness is largely due to the Board's position that all benefit increases be supported by an adequate increase in the contribution rate. As a result, while the liabilities of the system have increased, the period over which the unfunded liability can be amortized has decreased in the last two years.

Although the Teachers' Retirement System's financial position appears to be improving, we recommend that no legislative changes to improve benefits be supported by the Board without a continuation of its policy to increase the contribution rates accordingly.

The Teachers' Retirement System is now operating under a fully computerized system. This system has been very beneficial in allowing actuarial studies on the experience of the system. It has also allowed economical actuarial cost studies for proposed legislative changes.

Quality Control

While the computer has been beneficial from an actuarial standpoint, we are concerned about the quality of the information stored on the computer. It appears that the quality has improved in the last two years, but erroneous or incomplete information still exists. We recommend that a concentrated effort be made in the next two years to improve the quality of the data. Over 90% of the erroneous data could be detected by applying parameters through a computer program to disclose inconsistent data. Such a program should be prepared and detected errors be supplied to the Teachers' Retirement System for correction.

We have reviewed the extent of erroneous data and have concluded that it did not significantly affect the results of the valuation. As a result, it is our opinion that this report fairly represents the financial position of the Teachers' Retirement System from an actuarial standpoint.

Investment Yield

The Board of Investments prepared an report for 1976-77 showing an investment yield for the Teachers' Retirement System of 7.68%. This rate is .34% larger than the yield shown on page 12 of this report. At the request on the Teachers' Retirement Board, we have investigated the reasons for this discrepancy.

Part of the difference is attributable to the fact that the Board of Investments' figures are on a cash basis as opposed to the accrual basis used in this report. The biggest factor for the difference is that the Board of Investments does not include uninvested assets (cash) in its calculation of the investment yield.

SUMMARY OF BENEFIT PROVISIONS

Vesting Period	5 years. No benefits are payable unless the member has a vested right.
Final Average Salary	Average of 3 highest consecutive years of earnings.
Normal Form of Benefits	Life only annuity. All benefits cease upon death; however, in no event will the member receive less than the amount of his personal contributions with interest.
Normal Retirement Benefits	Minimum of 30 years service or age 60; maximum of age 70. The retirement benefit is equal to one-sixtieth (1/60) of final average salary for each year of service. The minimum benefit is equal to one-sixtieth (1/60) of \$4,800 for each year of service.
Early Retirement Benefits	Minimum age 55; the retirement benefit is calculated in the same manner as described for normal retirement, but the monthly benefit is reduced $\frac{1}{2}$ of 1% for each month early retirement precedes age 60.
Death Benefits	The death benefit is equal to one-sixtieth (1/60) of final average salary for each year of service accrued at date of death with an actuarial adjustment based on the relation of the member's age at death to his beneficiary's age. In addition, a child's benefit of \$100/month is paid to each child under the age 18 until he attains age 18.
Disability Benefits	The disability benefit is equal to one-sixtieth (1/60) of final average salary for each year of service accrued at date of disability. The minimum disability benefit is equal to one-quarter ($\frac{1}{4}$) of the final average salary.

Withdrawal Benefits

With less than 5 years of service, the accumulated employee contributions with interest are returned. With more than 5 years, the member may elect a refund of contributions with interest, or may leave his contributions and retain a vested right to death and retirement benefits.

Tax-Sheltered Annuity

The Teachers' Retirement System sponsors a tax-deferred annuity program for the benefit of its members. The policies of this program have been established in accordance with the guidelines set by the Internal Revenue Service. The benefits provided by this program are determined solely by the value of the member's account (voluntary contributions plus interest) using actuarial tables approved by the Retirement Board.

OLD TANG

3/253

MADE IN USA

DUO-TANG™
51258
MADE IN U.S.A.